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A Two-Process View of Trust and Distrust Building in Recommendation Agents: A Process-Tracing Study *

Sherrie Y. X. Komiak
Faculty of Business Administration
Memorial University of Newfoundland, Canada
skomiak@mun.ca

Izak Benbasat
Sauder School of Business
University of British Columbia, Canada
izak.benbasat@ubc.ca

Abstract

Prior literature focuses on trust, while largely ignoring distrust, partly because of the assumption that an Information Technology (IT) design that builds trust in the IT will also prevent distrust-building. However, this assumption may not be true if trust-building processes and distrust-building processes in the context of IT usage are different.

This paper proposes a two-process view of trust and distrust building, i.e., that trust-building and distrust-building processes are distinct and separate. In the context of recommendation agent (RA) usage in electronic commerce, a trust (distrust) process is defined as a customer's favorable (unfavorable) interpretation of his or her interactions with an RA, resulting in a positive (negative) expectation that the RA can be relied upon for his or her shopping decisions.

This study empirically tests a process theory rather than a variance theory. Variance theory research relies on logical arguments to explain and test the causality relationships among variables. Process theory research complements variance theory research by revealing and testing the mechanisms that constitute the processes by which certain variables influence others. In this process-tracing study, we collected and analyzed the concurrent verbal protocols from 49 participants using two RAs.

The results of our protocol analysis support the proposed two-process view. The pattern of trust-building processes in RA usage is systematically different from that of distrust-building processes, which may suggest that some RA features should be designed to increase trust, and others to decrease distrust. The findings also suggest that distrust deserves research attention on its own merit. In a complex relationship involving both trust building and distrust building, understanding both trust and distrust processes, rather than focusing on trust alone, can lead to a more accurate representation and improved management of that complex relationship.

Keywords: *trust building, distrust, recommendation agents, protocol analysis, process tracing*

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1. Introduction

Prior research has mainly focused on trust and largely ignored distrust, partly because of the assumption that trust building and distrust building are two ends of one continuum; thus, an IT (information technology) design that increases trust building in the IT will decrease distrust building at the same time. However, this assumption may not be true if trust-building and distrust-building processes in the context of IT usage are actually two separate and different processes. For example, a customer can use a web-based product recommendation agent (RA) to get personalized advice on which products to buy, based on his or her personal needs (Maes, Guttman and Moukas 1999; Xiao and Benbasat 2007). Online customers have to trust an RA before complying with its advice (Komiak and Benbasat 2006; McKnight, Choudhury and Kacmar 2002). In our protocol analysis study, an RA explained a product feature (computer screen) in detail using technical language. We observed that some users trusted this RA because its explanation was detailed and professional. But this RA's explanation feature does not necessarily automatically reduce distrust at the same time. Other users may not fully understand the technical explanation provided and their confusion about the RA's explanation may lead them to distrust the RA's competence and integrity. In another example, a finance website takes a while to download its contents. The downloading time may lead one customer to distrust the technical competence of the website because she does not know why she needs to wait so long. The same downloading time may lead to trust in the website if another customer believes the wait is due to many graphs and figures with valuable up-to-the-minute stock market information. Therefore, it is important to understand, through the collection of empirical evidence, the actual processes of trust building and distrust building, i.e., how users interpret an IT's features to form their trusting/distrusting beliefs.

This research theoretically proposes and empirically tests a two-process view of trust and distrust: that *the trust-building processes and the distrust-building processes are two sets of distinct and separate processes*. Trust (distrust) is defined as confident positive (negative) expectation regarding another's conduct (Lewicki, McAllister and Bies 1998). In the context of RA usage, "another's conduct" refers to an RA's interface, explanations, recommendations, and other features perceived by its users (online customers). A trust (distrust)-building process is a customer's favorable (unfavorable) interpretation of his or her interactions with an RA, resulting in a positive (negative) expectation that the RA can be relied upon for shopping decisions.

This paper contributes to the trust literature by investigating both trust and distrust processes and by conducting process theory research. First, it is valuable to understand both trust processes and distrust processes. If they are, indeed, different, then distrust merits more research on its own. Furthermore, understanding both trust and distrust rather than focusing on trust alone can lead to more accurate representation and improved management of the complex relationship that involves both trust building and distrust building. Rather than just designing an RA feature to increase trust building, the RA designers and owners may need to design some RA features to increase trust building and others to decrease distrust building. Second, this research is valuable as process theory research. Variance theory attempts to explain the variance in some dependent variables due to a set of independent variables. Process theory presents a series of occurrences in a sequence over time so as to explain how some phenomena come about (Mohr 2002). Variance theory research deals with variables (e.g., trust as a dependent variable and RA features as independent variables). It relies on logical arguments to develop causality, which is an abstraction and cannot be directly observed (Mohr 2002). Process theory research is valuable because it complements variance theory research by revealing and testing the natural mechanisms that constitute the process of transformation. For example, variance theory research can posit that longer downloading times will lead to distrust in the website's competence. This distrust may be unfounded; as shown in the example above, the same amount of downloading time may lead to either trust or distrust in the website's competence, depending on how a user *interprets* it, i.e., depending on which trust-building process or distrust-building process is employed by the user. Unlike variance process research, which only logically stipulates the causal relationship, process theory research can specify and empirically observe the process of trust/distrust building. It also separates the trust processes from the distrust processes,

unlike variance theory research, which aggregates the effects of trust and distrust processes by stating that overall. Although the process theory type of research (e.g., Earle 2004) is valuable, it is also scarce (Shaw and Jarvenpaa 1997) in the trust literature and in the DSS/KBS (decision-support systems/ knowledge-based systems) literatures, as RAs can be considered a specific type of DSS or KBS.

In the context of RAs used by online customers for shopping decision making, in order to test empirically the proposed two-process view of trust and distrust, we use a process-tracing method to address three research questions. First, in the context of RA usage, do trust-building processes and distrust-building processes co-exist? In this study, co-existence refers to a context where one may observe in the interaction with an RA both a high level of occurrence of the trust process and a high level of occurrence of the distrust process. The result will support the two-process view if co-existence is present. Second, do the pattern of the trust-building process and the pattern of the distrust-building process differ, and if so, how? The *pattern* of the trust (distrust) process is the relative frequency distribution[1] of the trust (distrust) process. Conceptually, each relative frequency represents the extent to which each process will contribute to trust (distrust) building. The pattern of the trust (distrust) process reveals the major individual processes, i.e., the individual processes whose relative frequencies (i.e., the extent of their contribution) are significantly higher than those of other candidate processes. The pattern of the trust (distrust) processes also indicates the manner in which people form their trust (distrust). The result will support the two-process view if patterns of trust building and distrust building do differ. Third, does the level of RA personalization affect the trust/distrust-building process, and if so, how? If the proposed two-process view of trust and distrust is valid, then it is possible that one change in the input of the trust/distrust process may cause changes (the numbers or the pattern) in the trust processes that are different from those in the distrust processes. If the two-process view is invalid, then a change in RA personalization should cause the same or very closely mirrored changes in both trust and distrust processes.

This paper is organized as follows: Section 2 discusses the literature on the relationship between trust and distrust and on the trust-building processes. Section 3 develops process models of trust and distrust building in the context of RA usage. We also discuss potential answers to the research questions that guide our theory building effort and the empirical process-tracing study. Section 4 explains the research method, which is a process-tracing study using verbal protocol data analysis. Section 5 reports the results of the protocol analysis. Finally, section 6 discusses the implications of the research.

2. Literature on Trust and Distrust

2.1 Theoretical Controversy on the Relationship between Trust and Distrust

Researchers usually agree that distrust is related to trust, but they seem to disagree on how they are related. The common definition of trust focuses on a trustor's dependence on a trustee, where such dependence indicates a risk for the trustor (e.g., Mayer, Davis and Schoorman 1995; McKnight et al. 2002). Trust can be a belief, an attitude, an intention, or a behavior; trust contains dimensions such as competence, benevolence, and integrity (Komiak and Benbasat 2006; McKnight et al. 2002). Compared to trust, distrust is an under-researched concept. Distrust is defined as the absence of trust (Slonim, Chiasson, Gates and McAllister 2001), or an absence or low level of trust (Mishler and Rose 1997). Low trust indicates high distrust (Stack 1988; Tardy 1988). Similarly, distrust can be an expectation that a trustee will behave in ways that do not ensure the trustor's safety and security (Baba 1999; Kramer 1999) or it can be a negation of trust (Cofta 2006).

The one-construct view of trust and distrust suggests that they exist at opposite ends of a single continuum (Trotter 2002; Worchel 1979). The trust construct is a linear continuum that is bounded by

[1] A relative frequency distribution is a tabular summary of a set of data showing the relative frequency of items in each of several non-overlapping classes. The relative frequency is the fraction or proportion of the total number of items belonging to a class. Source: http://www.statistics.com/resources/glossary/r/relfreqdist.php

high levels of distrust and trust (Singh and Sirdeshmukh 2000). In this view, trust and distrust are quantitatively rather than qualitatively different.

This view indicates that trust and distrust cannot co-exist. Indeed, behavioral decision theorists define trust as cooperative conduct, and distrust as non-cooperative conduct (Coleman and Li 2000). Distrusting choice and trusting choice are substitutes (Deutsch 2003) that do not co-exist. Social psychologists suggest that conflicting psychological states characterized by simultaneous trust and distrust are unstable and transitory (Lewicki and Bunker 1995; Lewis and Weigert 1985).

The one-construct view of trust and distrust also indicates that the positive predictors of trust are the negative predictors of distrust, and that the positive consequences of trust will be influenced negatively by increased distrust, because trust and distrust form a single continuum. Previous research suggests that distrust is the negative mirror-image of trust (Sztompka 1999). The increase of distrust is signaled by the decrease of trust, and the way to decrease distrust is also the way to increase trust (Hsiao 2003; Slonim et al. 2001). This view holds that distrust can be logically included in the model of trust; therefore, it can be processed by using the same reasoning, on the basis of complementary sets of evidence, such as positive evidence used to build trust and negative evidence used to build distrust (Cofta 2006).

However, in their seminal paper, Lewicki, McAllister, and Bies (1998) theorize that trust and distrust are two distinct constructs. Possible evidence of the two-construct view is that trust and distrust can co-exist in an inconsistent state. Consistency means a combination of high trust and low distrust or a combination of low trust and high distrust, while inconsistency means a combination of high trust and high distrust or a combination of low trust and low distrust. Two other key claims of Lewicki et al. are that trust and distrust factor separately and have different antecedents and consequences. Sitkin and Roth also suggest that trust and distrust are different constructs; they "assign the term 'trust' to refer to belief in a person's competence to perform a specific task under specific circumstances and the term 'distrust' to refer to the belief that a person's values or motives will lead them to approach all situations in an unacceptable way" (Sitkin and Roth 1993, p. 373). Kramer (1999) claims that trust and distrust may have different antecedents and consequences.

It is notable that the theorists proposing and supporting both views (the one-construct view and the two-construct view) have not provided empirical evidence of their own to support their contentions. In fact, there is an overall lack of empirical evidence in the literature to support either view. One exception is McKnight and Choudhury (2006), who provide empirical evidence to indicate that trusting beliefs and distrusting beliefs can be factored distinctly. They found that dispositional trust and dispositional distrust can co-exist in an inconsistent state and have different consequences (McKnight, Kacmar and Choudhury 2004). The present paper tries to address the relationship between trust and distrust from the perspective of process.

2.2 Literature on Trust- and Distrust- Building Processes

A summary of research on the process of trust building is shown in Table 1. This is an important basis for our process model of trust and distrust, as outlined in Section 3.1. It is notable that the literature in Table 1 is chiefly theoretical and conceptual, which suggests a need for empirical and contextual validation. It is also notable that we have not found any prior research on the distrust-building process.

3. Developing Process Models of Trust and Distrust

Based on prior research (Table 1 and Section 2.1), Section 3.1 proposes a conceptual taxonomy of the candidate trust/distrust process. These candidate processes are theoretically possible but so far empirically unsubstantiated. Section 3.2 discusses possible answers to the three research questions that serve as an explanation of our proposed two-process view of trust and distrust and as a guideline for our empirical test. This study proposes and tests the two-process view in the context of RA usage by an individual user in electronic commerce.

Table 1: Conceptualizations of the Trust-Building Process

Study	Trust-Building Process
(Brashear, Boles, Bellenger and Brooks 2003; Lewicki and Bunker 1995)	**Calculative process:** This is a process where costs and benefits of behavior are rationally compared. Trust emerges when a trustor perceives that a trustee's costs of cheating or engaging in opportunistic behavior are greater than the benefits of such actions. **Predictive process:** The predictive basis of trust development involves the ability of individuals to predict the actions of others; this ability to predict behavior comes from interaction with, and observation of, the other party. **Identification process:** Trust emerges in those relationships where one party identifies with the other party's desires and intentions.
(Chopra and Wallace 2003)	**Prediction**: Trustor evaluates the consistency of a target's past behaviors. **Attribution**: Trustor ascribes underlying qualities or motivations to a target based on observable evidence, including the words and actions of the target or other credible information. **Bonding**: The development of an emotional relationship between trustor and target. **Reputation**: Trustor trusts a target based on others' recommendation. **Identification:** Trustor trusts a target when a common identity, goals, and values are perceived.
(Doney and Cannon 1997)	**Calculative**: Trustor calculates the cost and/or rewards of a target acting in an untrustworthy manner. **Prediction**: Trustor develops confidence that a target's behavior can be predicted, through repeated and broader experience. **Capability**: Trustor assesses a target's ability to fulfill its promises, based on available evidence **Intentionality**: Trustor evaluates a target's motivations based on the target's words/behaviors. **Transference**: Trustor draws on "proof sources" from which trust is transferred to a target.
(Earle 2004)	1) Derived from normative considerations, trust is based on universally applicable factors such as fairness and objectivity. 2) Based on social-psychological theory, trust is based on agreement or similarity and is context-specific.
(Kretschmer and Rousseau 2001)	**Calculus-based trust:** Trust derives not only from the existence of deterrence, but also from creditable information regarding a target's intentions or competence. **Relational trust:** Trust derives from repeated interactions over time between trustor and target. Information available to the trustor from within the relationship itself forms the basis of relational trust. **Institution-based trust:** Institutional factors act as the basis for trust.
(Lewis and Weigert 1985)	**Cognitive-based trust:** A cognitive process in which a trustor cognitively chooses whom he/she will trust, to which degree and under what circumstances, and bases this choice on what are taken to be "good reasons," constituting evidence of trustworthiness. **Emotion-based trust:** Trustor develops positive affects with a target when an emotional bond exists between trustor and the target. Trust derives from the trustor's knowledge that the violation of trust threatens to bring severe emotional pain to all those implicated in the trust relationship, including the violator (target). **Behavior-based trust:** When a trustor sees a target acting in ways implying that the target trusts the trustor, the trustor becomes more disposed to reciprocate that trust. The target's trust-implying actions also help to establish or reinforce the emotional sentiment of trust.
(McKnight, Cummings and Chervany 1998)	**Categorization**: Unit grouping: trustor puts a target in the same category as himself/herself Reputation categorization: Trustor assigns attributes to a target based on second-hand information. Stereotyping: Trustor places a target into a general category of persons. **Illusion of control**: Trustor takes small actions to try to assure himself/herself that things are under his/her personal control; this leads to trust.
(Slonim et al. 2001)	**Affect-based trust:** Trustor's attributions concerning the motives for a target's behavior. **Cognition-based trust:** Trustor's attributions mainly concerning the target's competence, reliability, and dependability, based on available knowledge about the target.

3.1 Candidate Processes of Trust/Distrust Building

Based on prior literature dealing with the trust-building process (Table 1) and a process/outcome trust model proposed by Johns (1996), this section develops a conceptual taxonomy of candidate trust/distrust processes that are relevant in the context of RA usage.

Johns (1996) suggests a four-stage model of trust process and outcome. The first stage is the assimilation of information about the potential trustee and the relevant situation (i.e., an RA's knowledge base, interface, and outcome-related processes). The second stage relates to decision making, which involves processing information assimilated during the previous stage. Such information processing leads to the beliefs of the trustor regarding the trustworthiness of the potential trustee (i.e., trust attribution). If the potential trustee is deemed sufficiently trustworthy, the trustor enters into a trusting relationship, which is depicted in the third stage of the trust model. This relationship is defined as a willingness to assume vulnerability and rely upon someone or something to perform as expected. The fourth stage of the process relates to the consequences of entering into a trusting relationship in context-specific situations.

This paper focuses on the processes of trust/distrust building; thus, we focus on the first two stages in Johns' (1996) trust model. We develop a conceptual taxonomy of the trust/distrust-building process in stage one – the process of evaluating an RA's knowledge-base, interface, and recommendations - and in stage two – the process of attributing the customer's perceptions to the RA's trustworthiness.
We develop a set of candidate trust/distrust processes in two steps. Step 1 creates a tentative scheme of trust/distrust processes based on prior research as summarized in Table 1. Step 2 involves a pilot test and protocol analysis to examine the relevance of these processes in the context of RA usage. A test group of 17 subjects was asked to think aloud while interacting with an RA. Their utterances were recorded, transcribed, and then analyzed independently by two judges (the first author and a research assistant who was a Ph.D. student majoring in MIS). The research assistant did not know the proposed two-process view. These two judges independently identified the trust and distrust processes in the verbal protocols, and then classified these processes according to the tentative scheme developed in Step 1. Based on the protocol analysis results of the pilot test, the tentative scheme was modified by deleting processes that seldom showed up in the pilot test (e.g., unit grouping, stereotyping, calculative trust, institutional trust, and identification processes). New processes identified in the pilot test were added, although they were not suggested in prior literature on trust process (e.g., "awareness of the unknown" interpretation, verification, and expectation evaluation processes).

As this study focuses on the trust/distrust-building process based on customers' first-hand experience with RA usage, our tentative categorization excludes the trust-building processes that are *independent of direct RA usage*, such as disposition to trust, institution-based trust, and transference of trust. The resulting categories are as follows:

Information Sharing Evaluation Process (Knowledge 1)

This process mainly evaluates an RA's knowledge base. RAs are useful because of their knowledge base of products and of how to match those products with a customer's personal needs. If an RA shares detailed and sound knowledge about products with the customer, and if the shared information is deemed to be of an adequate amount, then the customer will have a favorable impression of that RA. Trust will develop if the RA's expertise can be relied on and if the RA is perceived to have the benevolence to help the customer. The RA may do so by justifying its reasoning process explicitly, explaining the product attributes in detail, or sharing thorough product information with customers. However, if the RA provides only very limited information to the customer, then the customer will interpret it as evidence of an RA's incomplete knowledge base. This will result in distrust of the RA's ability to give good advice. Distrust can also develop if an RA provides too much information that confuses or overwhelms the customer. The customer will interpret this unfavorably as a lack of caring for the customer and the inability to give good advice.

This process is related to the capability process (Doney and Cannon 1997) and cognitive-based trust

(Chiasson, Hawkey, McAllister and Slonim 2002; Lewis and Weigert 1985) shown in Table 1. In an information-sharing evaluation process, a customer assesses an RA's ability to give a product recommendation (capability process) based on his or her judgment on the amount and the appropriateness of the information shared by the RA (cognitive-based trust process).

An example of the trust process at work from the protocol data collected is: "The description of the [product] features includes why someone would use it, rather than just a plain definition. This is good." Examples of the distrust process include "Special features? I need a lot of information on this" and "Well, for brand it [the RA] doesn't tell me who has the better reputation or anything like that so…."

"Awareness of the Unknown" Interpretation Process (Knowledge 2)

This is the process by which customers deal with their awareness of an unknown, i.e., one realizes that he or she does not know about some aspects of an RA during his or her interactions with it (Komiak and Benbasat 2004). Trust is particularly relevant in conditions of ignorance or uncertainty with respect to the unknown or unknowable actions of others (Gambetta 1988). A customer may develop trust or distrust depending on how he or she subjectively interprets his or her awareness of the unknown.

Sometimes, a customer's awareness of the unknown can be resolved quickly, or customers may work out a plausible explanation for the unknown and convince themselves to accept the explanation. In this case, trust develops, or at least trust does not decrease. For example, in our process-tracing study, a customer said, "Why are the recommendations dominated by Dell? Well, maybe Dell computers are cheap, which better fits my budget."

More often, awareness of the unknown makes customers suspicious and uncomfortable. Suspicion is characterized as a psychological state in which perceivers "actively entertain multiple, possibly rival, hypotheses about the motives or genuineness of a person's behavior" (Fein and Hilton 1994, p168). Suspicion has been viewed as one of the central cognitive components of distrust (Deutsch 1958; Kramer 1999). An example from our process-tracing study was: "I don't know why [the RA recommended this], it makes me uncomfortable."

This process is partly related to capability process (Doney and Cannon 1997) and cognitive-based trust (Chiasson et al. 2002; Lewis and Weigert 1985) shown in Table 1, because customers may judge an RA's capability or other trust-related attributes based on their observations that something is missing or unknown in the RA.

Control Process (Usability 1)

Control often builds trust (Ariely, Lynch and Aparicio 2004), because control over an RA fosters a sense of certainty and predictability in the customer. If an RA's interface or other features enable a customer to do what he or she wants, the customer feels in control and will have a favorable interpretation of the RA's features. This will result in trust of the RA. In contrast, if an RA's interface or other features make a customer unable to do something he or she wants to do, the customer will feel a loss of control. This will cause the customer to interpret the RA's features unfavorably, and therefore to develop distrust in the RA. Mcknight et al. (1998) say that the illusion of control is an unrealistically inflated perception of personal control that helps build trust. Our pilot test results show that the feeling of being in control is more than an illusion – it is real. The control process involves the customers' interpretations of their perceptions, including being more familiar with how to use an RA to perform the product selection task and being more comfortable with the functions and choices provided by the RA.

This control process is related to the prediction process (Brashear et al. 2003; Chopra and Wallace 2003; Doney and Cannon 1997) and the Illusion of control process (McKnight et al. 1998), shown in Table 1. The consistency of an RA's interface and other behaviors can create a sense of confidence that the RA's behavior can be predicted. This increases the customers' sense of control, leading to their trust.

In our protocol study, an example of the trust process is: "I can easily sort the recommended products by price or product features. I can sort them in the way I want." An example of the distrust process is: "That would reduce my trust in the RA's goodwill a little because I lose a little bit of the sense of control."

Interface Attraction Evaluation Process (Usability 2)

An RA's attractive and easy-to-understand interface will elicit a customer's favorable interpretation of the RA's interface and other features, leading to trust. In contrast, an unattractive or confusing interface will elicit the customer's unfavorable interpretation of the RA's interface, leading to distrust. Likewise, in real life, people tend to trust a clean-looking restaurant and distrust a dirty-looking one. In trust literature, interface (appearance) has been suggested as an antecedent of trust (e.g., Swan, Bowers and Richardson 1999).

This process is connected to emotion-based trust (Lewis and Weigert 1985). An attractive (unattractive) interface has a positive (negative) affect that will facilitate a favorable (unfavorable) interpretation of the RA's features. This leads to trust (distrust) building. This interface attraction process is partially linked to cognitive-based trust (Lewis and Weigert 1985). An attractive and easy-to-understand interface can be taken as a good reason to trust the RA, while an unattractive and confusing interface may be taken as a good reason to distrust it.

In our process-tracing study, examples of the trust process include: "Yeah, the red [word] warns me that this is what I wanted" and "Here is the button for 'refine your search'. Oh that's better. Most people would click 'back,' so that's kind of confusing." An example of the distrust process is: "The RA gives me the recommendation in red. I do not like the red color; it reminds me of my exam papers. Red means wrong."

Verification Process (Outcome 1)

When a customer is interacting with an RA, he or she may also use his or her knowledge from another source to judge the truth and the usefulness of the information (i.e., recommendations and explanations) provided by the RA. When customers are able to use "knowledge from another source" to determine whether the information provided by an RA is true or useful, they will have a favorable interpretation of the RA's competence and integrity. This develops trust in the RA. However, if customers are able to use "knowledge from another source" to verify that some information provided by the RA is not true, this negative verification will cast doubt on the RA's competence or integrity. This results in distrust of the RA.

The "other" source of knowledge used in a verification process can be a third party like a friend or an authority, or the general reputation of a product and a company; the other source can also be the customer's prior relevant experience. When the source of verification is a third party that the customer trusts, this verification process is related to the transference process (Doney and Cannon 1997), reputation process (Chopra and Wallace 2003), and reputation categorization process (McKnight et al. 1998), also shown in Table 1. In these three processes, a trustor draws on others' recommendations; thus, trust (or distrust) is transferred from a third party to the target — an RA in this case. An example of the trust process is: "Yes, the RA recommends the IBM laptop. My friend has had one IBM for two years and she like[s] it." An example of the distrust process is: "I have never heard of that brand. This laptop must be not so good."

In addition, from our process-tracing study, we find that the source of knowledge used in the verification process can also be the customer's own experience. For example, a participant in our study thought aloud, "I kind of trust the RA's recommendation. That's about $2,000. I've looked for prices in the Future Shop before." An example of the distrust process is: "Oh, a Dell laptop, I had one before. It was too heavy for me."

Expectation Evaluation Process (Outcome 2)

A person's judgment of a target usually depends on a comparison of the target's actual performance and the person's expectation of the target. When an RA's behaviors confirm or exceed a customer's

expectations, the customer's interpretation of what the RA has done will be favorable; thus, he or she will form trust in the RA. However, if an RA's behaviors are below or contrary to the customer's expectations, then the customer will interpret the RA's behaviors unfavorably; thus, he or she will form distrust.

Although this process is not covered by any of the references in Table 1, it has been added because our pilot test showed that the process was relevant in the context of trust in RAs. This process is also consistent with the variance type of trust research that suggests that behaving as expected will lead to trust (Sheppard and Sherman 1998) and that expectation disconfirmation will lead to distrust (Deutsch 2003).

An example is: "The options are definitely within what I specified." Another example is: "I wish I had more choices in processor speed because there is quite a difference between 1000 and 2000 mhz."

Competence Attribution Process (Attribution 1)

According to Johns' trust model (1996), a customer will interpret the information about an RA assimilated during his or her interaction with it, and then form beliefs on the RA's trustworthiness. Three major dimensions of trustworthiness are competence, benevolence, and integrity (Mayer et al. 1995); consequently, there are three attribution processes through which a customer attributes his or her perceptions of an RA to the RA's internal characteristics.

A Competence Attribution Process is a process in which a customer ascribes competence (trust) or incompetence (distrust) to an RA as its intrinsic and trustworthiness-related characteristic, based on observable evidence. This process is similar to the Capability process (Doney and Cannon 1997) and the Attribution process (Chopra and Wallace 2003) in Table 1, because these two processes are also processes through which a person assesses a target's ability and ascribes underlying qualities (i.e., competence in this case) to a target (i.e., an RA in this case), based on observable evidence. A Competence Attribution Process is also related to the Cognitive Base of Trust (Lewis and Weigert 1985; Slonim et al. 2001), because a customer cognitively chooses whether to trust or distrust an RA based on what are taken to be "good reasons" (i.e., observable evidence about an RA). An example of the trust process is: "The fact that this RA communicates all these brands gives me a sense that it's fairly comprehensive." An example of the distrust process is: "This RA is not that good because it did not let me specify 'Battery Life.' This attribute is important to me since I travel a lot."

Benevolence Attribution Process (Attribution 2)

The second attribution process is the Benevolence Attribution Process. It is a process in which a customer ascribes benevolence (trust) or not (distrust) to an RA, based on observable evidence. It is similar to the intentionality process (Doney and Cannon 1997), emotion base of trust (Lewis and Weigert 1985), and affect-based trust (Slonim et al. 2001), shown in Table 1. These three processes address a person's evaluation of a target's internal motivations, including the target's perceived benevolence toward the person. An example is: "The RA cares about my interests."

Integrity Attribution Process (Attribution 3)

The integrity Attribution Process, the third attribution process, is a process in which a customer ascribes integrity (or not) to an RA as its intrinsic and trustworthiness-related characteristic, based on observable evidence. This process is similar to the intentionality process (Doney and Cannon 1997) and affect-based trust (Slonim et al. 2001), shown in Table 1, because they address a person's evaluation of a target's internal motivations, including the target's integrity. An example of the trust process is: "There seems to be no special emphasis on one particular retailer or vendor." An example of the distrust process is: "Why are all the recommendations for Sony? Is the RA pushing Sony?"

3.2 The Processes of Trust vs. Distrust Building

We will explain the two-process view by addressing the three research questions outlined in the Introduction section.

Question 1: Will the trust process and the distrust process co-exist in RA usage?

The two-process view indicates that trust and distrust processes can co-exist separately in the interactions between a customer and an RA. This is consistent with the two-construct view, which suggests that trust and distrust can co-exist in an inconsistent state (Lewicki et al. 1998).

In the context of RA usage, it is possible that the trust and distrust processes co-exist inconsistently and simultaneously. First, multifaceted or multiplex relationships will enable parties to hold simultaneously different views of each other – views that may be accurate, but nonetheless inconsistent (Lewicki et al. 1998). The relationship between a customer and an RA is multifaceted and multiplex because a customer assumes the double roles of customer and IT-user, and because an RA may represent an e-vendor, a virtual salesperson, or a virtual shopping assistant on a website. Thus, the RA assumes the role of social actor as well as the role of tool. In addition, an RA is necessarily imperfect (i.e., the RA will have some features that are perceived positively and others negatively). These RA features may be attributed to multiple characteristics (competence, benevolence, and integrity) that do not necessarily co-vary. There are also different ways for the customer to interpret any one piece of information about the RA. Therefore, both the trust and distrust processes may be at work during the direct interaction between a customer and an RA.

Second, balance and consistency in one's cognitions and perceptions are more likely to be temporary and transitional states; people are dominant in states of imbalance and inconsistency because they often have inadequate or incomplete information to achieve balance or resolve inconsistency (Lewicki et al. 1998). In the context of RA usage, the inconsistency between individual trust-building and distrust-building processes is not necessarily resolved quickly and simply while the customer is still interacting with the RA. It is natural that a customer may develop a trust process with an RA at one moment and a distrust process with the same RA at the next moment. It is also reasonable that the customer may develop a trust process regarding one aspect of the RA and then develop a distrust process regarding another aspect. When customers are interacting with an RA, they are still perceiving and interpreting pieces of knowledge about it. At this point, they will not be able to conclude whether or not the RA is trustworthy overall.

Question 2: Will the patterns of the trust and distrust processes differ in RA usage?

Lewicki et al. (1998) suggest that another piece of evidence of the two-construct view of trust and distrust is that trust and distrust are formed in different ways. Accordingly, our two-process view proposes that the pattern of trust processes and the pattern of distrust processes in RA usage will systematically differ. Differing patterns represent different ways in which people form trust or distrust in the RA.

Different patterns of trust and distrust processes mean that some candidate processes indicated in Section 3.1 may mainly contribute to trust building, while others may mainly contribute to distrust building. In other words, the two-process view of trust and distrust suggests that the shares (i.e., relative frequencies) of the candidate processes in trust building will be significantly different from their shares of the same candidate processes in distrust building. For example, it is possible that the "Awareness of the unknown" Interpretation Process may mainly contribute to distrust building but not to trust building, because usually a person's awareness of the unknown about an RA will elicit his or her puzzlement and suspicion, thus leading to distrust building.

Question 3.1: Will perceived personalization of RAs affect the pattern of the trust process (question 3a) and the pattern of the distrust process (question 3b)?

Will RAs' characteristics affect the trust (distrust) process in the context of RA usage? The answer should be yes if the proposed two-process view is valid. According to the two-process view, trust building and distrust building are two separate processes. Two separate processes can be affected by the same antecedent in different ways. RAs' features and behaviors (i.e., two RAs with different personalization levels) are the input to the trust and distrust processes; changing the input may trigger different changes in trust/distrust building processes. The challenging question is how RA characteristics affect the trust/distrust processes. An understanding of such effects is needed to inform RA design. So far we have not found any prior research answering this question.

It is possible that the perceived personalization of RAs will affect the pattern of the trust process, because it is possible that the RA with higher personalization may elicit a disproportionately greater number of some candidate processes (e.g., Expectation Evaluation and Competence Attribution), because of the need-based questions, than an RA with lower personalization. Such changes mean that the relative shares of the trust processes will be greater for an RA with higher personalization than for an RA with lower personalization. Therefore, the level of RA personalization will alter the pattern of trust building. In other words, the answer to question 3a can be "yes." Similarly, the level of RA personalization can change the pattern of distrust building (question 3b), because the RA with lower personalization may elicit a disproportionately greater number of some processes (e.g., "Awareness of Unknown" Interpretation) than the RA with higher personalization.

However, it is also possible that the patterns of trust and distrust processes are inherent and stable because they reside in a customer's manners of thinking. In other words, the distinction of these patterns may be rooted in people's cognitive information processing, rather than in the RAs' characteristics. It is also possible that the RAs' different personalization levels may not be distinct enough to change a customer's manner of thinking. Thus, it is possible that the pattern of the trust-building process may stay stable across two RAs with different personalization levels. Similar possibilities also exist for the distrust process pattern.

In order to test questions 3a and 3b, and to increase the generalizability of our protocol study, we traced and analyzed the trust and distrust processes in two cases: a group of our experiment participants used an RA with higher personalization, and the other group used an RA with lower personalization. We chose personalization because it is a fundamental characteristic of RAs as a prototype of personalization technologies (Komiak and Benbasat 2006). These two RAs have different levels of personalization because the RA with higher personalization asks customers the questions about their needs (i.e., why are they shopping for the product?), while the RA with lower personalization only asks customers to directly specify their requirements for each product attribute (Komiak and Benbasat 2006). Our expectations of question 3.1 will be supported if the pattern of the trust (distrust) process for one RA is different from the pattern of trust (distrust) process for the other.

Question 3.2: Will perceived personalization of RAs affect the number of trust processes (question 3c) and the number of distrust processes (question 3d)?

Will RA personalization affect the number of trust (distrust) processes activated when a customer is interacting with the RA? It has been observed that a higher personalized RA elicits a higher level of customer trust than a lower personalized RA (Komiak and Benbasat 2006). It is intuitive and logical to believe that a higher level of trust is associated with a higher number of trust-building processes and a lower number of distrust building-processes.

We expect that the number of trust processes elicited by the RA with higher personalization will be greater than that elicited by the RA with lower personalization (Q3c). The RA with higher personalization activates the customer's self schema more than the RA with lower personalization. The self schema contains information about oneself, including perceptions, attributes, and experiences related to the self (Wyer and Srull 1989). Personalized web stimuli that activate the self schema are likely to attract more attention, be processed to a larger extent, and lead to more favorable interpretations (Tam and Ho 2006). An RA with higher personalization activates the customer's self schema more by asking additional questions about the customer's personal needs (i.e., what do you need this product for?) and explicitly linking the customer's personal needs to the specifications of the preferred product attributes, which are the bases of the RA's product recommendations. Since the self is involved in cognitive processing and because of its lasting existence in working memory, concepts related to the self are likely to exert a strong influence on memory recall, judgment, and behavior (Wyer and Srull 1989). The higher personalized stimuli (e.g., the RA with higher personalization) will be clicked by the customer more often, explored more often, and remembered better; this will strongly influence the customer's final choice of product and his or her evaluation of the RA (Tam and Ho 2006). Thus the RA with higher personalization will elicit more information-processing processes in the customer's mind. It is very likely that such information-processing processes are favorable interpretations of the RA with higher personalization, because

such an RA provides more relevant information content; it also facilitates the understanding of the RA's information content by explicitly linking it to the customer's needs. Therefore, the RA with higher personalization will elicit more trust-building processes.

In contrast, we foresee that the number of distrust processes elicited by the RA with higher personalization will be lower than that elicited by the RA with lower personalization (Q3d). The RA with lower personalization will have a less competent knowledge-base (no information about how to link a customer's personal needs to the product attribution specifications) and make the customer aware of more unknowns about that RA.

4. Research Method

We collected concurrent verbal protocols (Todd and Benbasat 1987) by recording subjects' thinking-aloud talks, and then were transcribed and analyzed them to examine the processes of trust and distrust building. They provide a rich set of data about the customers' psychological interpretation processes. Subjects used two commercial RAs from http://www.activebuyersguide.com/ to shop for notebook computers. We chose these two RAs because they were real RAs instead of simulations, they were independently provided (i.e., not associated with any retailers), and they were largely unknown to our potential subjects. One RA had a lower personalization, while the other had a higher personalization. Otherwise, the product attributes specified in these two RAs and the terminology explanations for each product attribute were the same. The two RAs also used similar methods to filter product-building and similar interfaces. However, the RA with higher personalization employed need-based questions to help customers specify each product attribute, while the RA with lower personalization did not have any need-based questions. Thus, these two RAs had significantly different levels of perceived personalization (Komiak and Benbasat 2006).

A group of 49 student subjects enrolled at a North American business school participated in the main experiment. All subjects were randomly assigned to one of the two RAs. Of the 49 participants, 22 subjects used the RA with lower personalization and 27 the RA with higher personalization. Because this study targets a particular population — customers with online shopping experience — we prescreened the volunteering subjects. Only those who had shopped online before and who were interested in buying notebook computers were invited to participate. Based on data from a background questionnaire, the average participant was 23 years old, spent $300 shopping online in the previous year, and reported 4.8 on a 7-point scale for being comfortable with shopping online and 6.4 for being comfortable with using computers. About half were male, 70 percent were senior undergraduate students, and 30 percent graduate students. None of the subjects had used any RA at www.activebuyersguide.com before participating in our experiment. The incentive for participation was $15 plus one mark in a course grade. We also controlled for product expertise. We measured the subjects' product expertise by using a self-reporting scale and two objective testing questions about laptops. The average of the three scales for each subject represented his or her product expertise. The results showed that there was no significant difference in product expertise between the two groups of subjects: the RA with lower personalization group (M=2.0 out of 7.0; SD=0.7) vs. the RA with higher personalization group (M=2.5; SD=2.3), 2-tailed t-test, t=-1.48, p=0.15.

Each subject participated in the experiment individually. Subjects were allowed to take as much time as needed to finish the shopping. The procedures were as follows: (1) the subject completed a consent form and a background questionnaire; (2) the subject was given a tutorial to practice thinking aloud and to learn how to use an RA; and (3) the subject thought aloud while using an RA to shop for a notebook computer. To minimize potential validity problems, we instructed each subject only to think aloud while interacting with an RA and not to explain their thought process, and we did not probe for specific facts (Shaft and Vessey 1995).

5. Results

On average, a subject's verbalizations lasted about 25 minutes. In total, we coded 1,062 processes of trust building and 947 processes of distrust building, using the category scheme described in Section

3.1. To provide a basis for reliability assessment, two judges independently coded the protocols. First, before the protocols were coded, each participant's verbal protocols were broken into episodes (i.e., units of coding) so that each episode contained only one trust or distrust process. Then, the two judges mapped the trust and distrust processes identified from the verbal protocols to the candidate trust/distrust processes outlined in Section 3.1. Both judges were familiar with the trust literature and were provided with the definitions of the candidate trust/distrust processes described in Section 3.1. One judge did not know any proposition suggested in Section 3.2. Cohen's coefficient of agreement was 79 percent (Cohen 1960), which indicates a good inter-judge agreement.

To address question 1 (Q1), we proposed that the trust-building process and the distrust-building process can co-exist simultaneously and separately. This was supported. Every subject reported both trust and distrust processes during his or her interaction with an RA. We calculated each subject's percentages of the trust and distrust processes out of the total number of his or her processes of both trust and distrust. A 2-tailed t-test shows that the percentages of trust-building processes were significantly higher than 0 percent: N=49, mean =53%, SD=18%, t=21, $p<0.001$. Another 2-tailed t-test shows that the percentages of distrust processes were significantly higher than 0%: N=49, mean =47%, SD=18%, t=19, $p<0.001$.

In addition, we tested Q1 within the group of participants who used the RA with lower personalization. The 2-tailed t-test results show that both the percentages of trust- building processes (N=22, mean =44%, SD=17%, t=12, $p<0.001$) and the percentages of distrust-building processes (N=22, mean =56%, SD=17%, t=16, $p<0.001$) are significantly greater than 0 percent. Similarly, within the group of participants who used the RA with higher personalization, the 2-tailed t-test results show that both the percentages of trust-building processes (N=27, mean =60%, SD=15%, t=21, $p<0.001$) and the percentages of distrust-building processes (N=27, mean =40%, SD=15%, t=14, $p<0.001$) are significantly greater than 0 percent. These results demonstrate that trust process and distrust processes co-exist in RA usage regardless of the type of RA used.

To address question 2 (Q2), we proposed that the pattern of the trust-building process would be significantly different from the pattern of the distrust-building process in RA usage. We conducted a Chi-square test to compare the pattern of trust processes and the pattern of distrust processes (Chi square = 17.6, df=8, $p<0.05$). The protocol analysis results, as shown in Figure 1 and Table 2, supported our expectations.

In addition, we tested Q2 within the two groups using different RAs. The results (Table 3) show that in both groups, our proposition is supported. In the group that used the RA with lower personalization, the pattern (relative frequency distribution) of trust processes differs from the pattern of distrust processes: Chi square = 17.6, df=8, $p<0.05$. In the group that used the RA with higher personalization, the pattern of trust processes differs from the pattern of distrust processes: Chi square = 44.3, df=8, $p<0.001$.

We tested whether RA personalization would affect the pattern of the trust process (Q3a) and the pattern of the distrust process (Q3b). As shown in Figure 2, the pattern of the trust process for the RA with lower personalization is not significantly different from the pattern of the trust process for the RA with higher personalization (Chi square = 4.92, df=8, $p>0.99$). Similarly, as shown in Figure 3, the pattern of the distrust process is not significantly different for two different RAs (Chi square = 6.72, df = 8, $p > 0.99$). Thus, our expectation regarding question 3.1 was not supported. It seems that customers use similar trust-building and distrust-building strategies with two different RAs.

The protocol analysis results (Table 3) supported our expectations regarding question 3.2. The number of trust processes elicited by the RA with higher personalization (average number of trust processes per subject is 24.0) is significantly greater than that elicited by the RA with lower personalization (average is 18.5): one-tail t-test, $p<0.05$; thus, Q3c is supported. The number of distrust processes elicited by the RA with higher personalization (average number of distrust processes per subject is 16.1) is significantly fewer than that elicited by the RA with lower personalization (average is 23.2): one tail t-test, $p<0.01$. Thus, Q3d is supported.

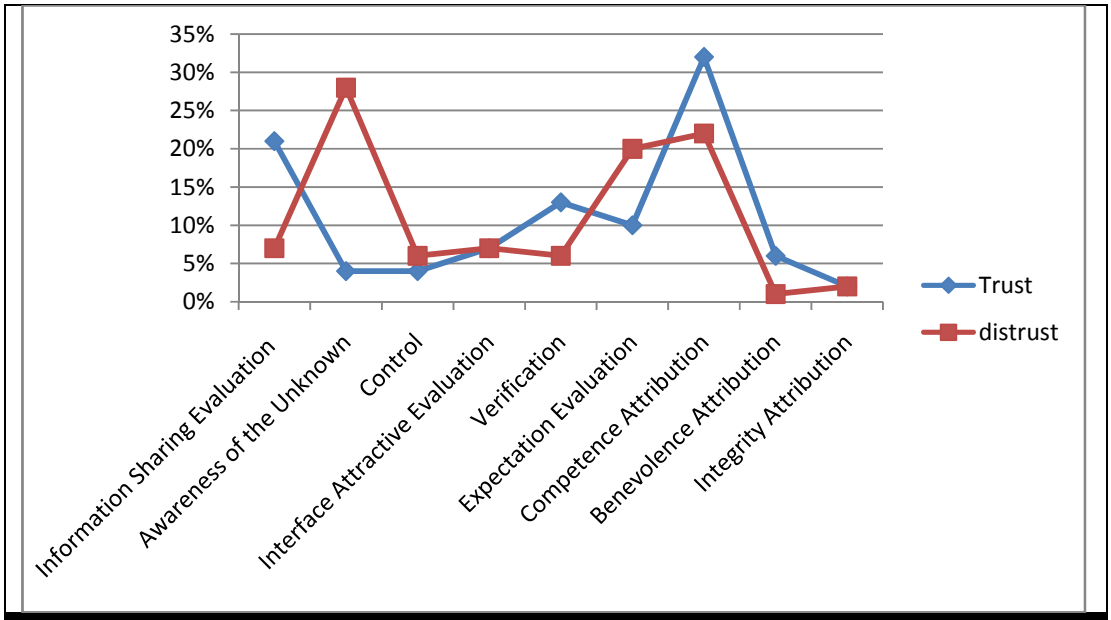

Figure 1: Pattern of Trust Processes and Pattern of Distrust Processes Differ

Table 2: Pattern of Trust Processes and Pattern of Distrust Processes Differ

Process		Trust: number & %		Distrust: number & %	
Knowledge 1	Information Sharing Evaluation	219	**21%**	68	**7%**
Knowledge 2	"Awareness of the Unknown" Interpretation	43	**4%**	267	**28%**
Usability 1	Control	47	**4%**	59	**6%**
Usability 2	Interface Attractive Evaluation	74	**7%**	68	**7%**
Outcome 1	Verification	140	**13%**	56	**6%**
Outcome 2	Expectation Evaluation	110	**10%**	191	**20%**
Attribution 1	Competence Attribution	341	**32%**	206	**22%**
Attribution 2	Benevolence Attribution	62	**6%**	14	**1%**
Attribution 3	Integrity Attribution	26	**2%**	18	**2%**
	Total	**1062**	**100%**	**947**	**100%**

Table 3: RA Personalization and Patterns of Trust/Distrust Processes

***Lower* Personalized RA (sample # = 22)**					
Process		**Trust: # & %**		**Distrust: # & %**	
1	Information Sharing Evaluation	104	25%	43	8%
2	"Awareness of the Unknown" Interpretation	16	4%	135	26%
3	Control	20	5%	34	7%
4	Interface Attractive Evaluation	39	9%	25	5%
5	Verification	50	12%	19	4%
6	Expectation Evaluation	42	10%	101	20%
7	Competence Attribution	117	29%	135	26%
8	Benevolence Attribution	17	4%	7	1%
9	Integrity Attribution	6	1%	12	2%
	Total	411	100%	511	100%
***Higher* Personalized RA (sample # = 27)**					
Process		Trust: # & %		Distrust: # & %	
1	Information Sharing Evaluation	115	18%	25	6%
2	"Awareness of the Unknown" Interpretation	27	4%	132	30%
3	Control	27	4%	25	6%
4	Interface Attractive Evaluation	35	5%	43	10%
5	Verification	90	14%	37	8%
6	Expectation Evaluation	68	10%	90	21%
7	Competence Attribution	224	35%	71	16%
8	Benevolence Attribution	45	7%	7	2%
9	Integrity Attribution	20	3%	6	1%
	Total	651	100%	436	100%

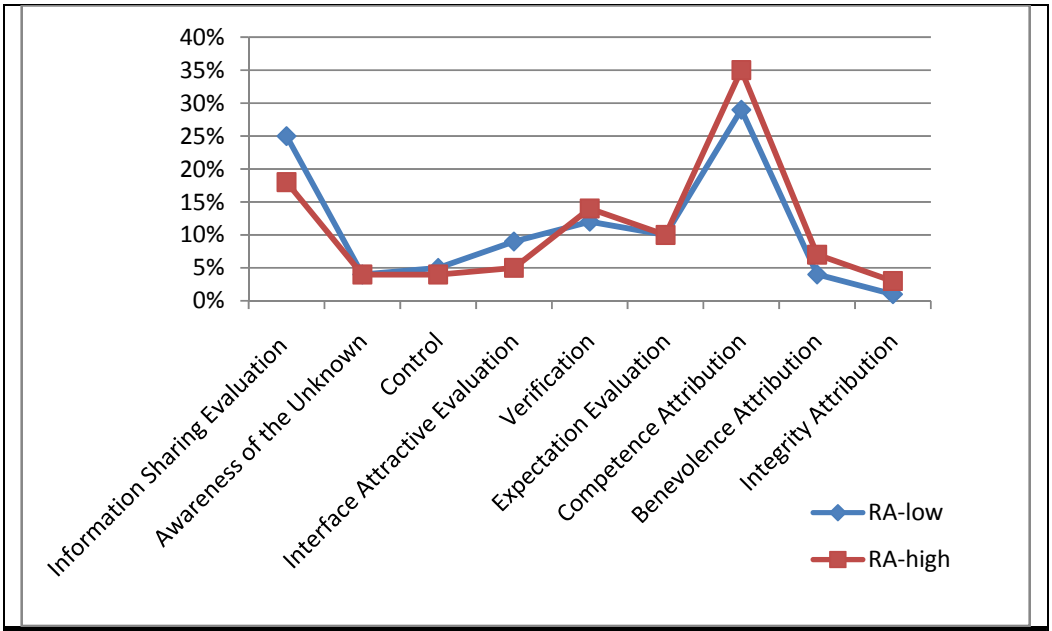

Figure 2: Pattern of Trust Processes is similar: RAs with lower vs. higher personalization

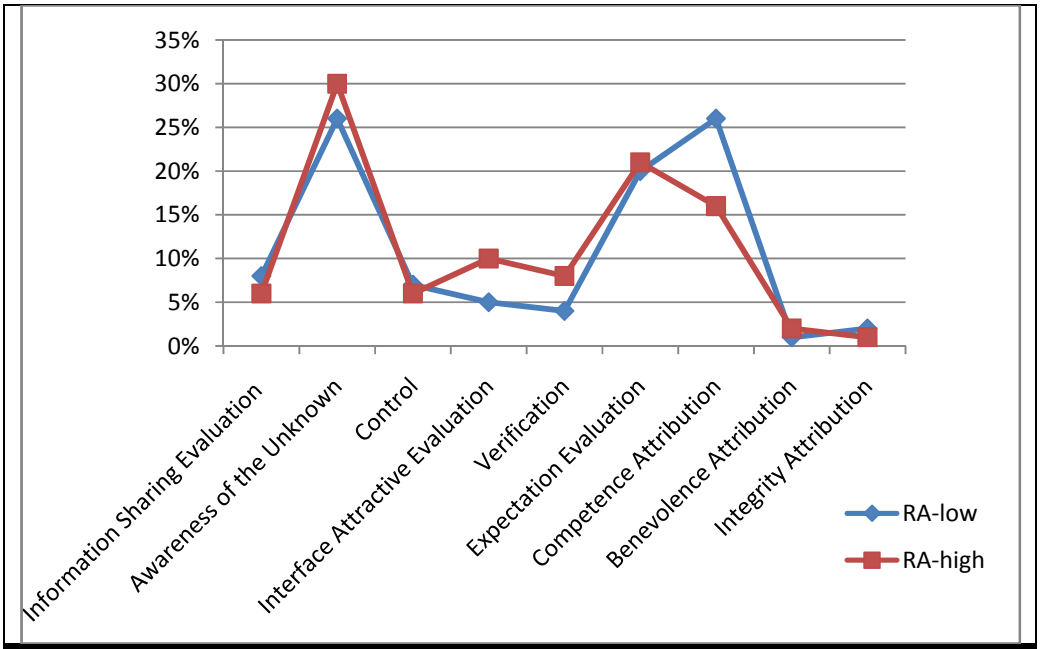

Figure 3: Pattern of Distrust Processes is similar: RAs with lower vs. higher personalization

6. Discussions and Implications of Findings

In this section, we first discuss the limitations of the study, and then its theoretical and practical implications.

6.1 Limitations

The limitations of this study center on its sample size and the use of student subjects. First, 49 is a small number of subjects, which limits our ability to use regression or SEM (structural equation modeling) methods to analyze the relationships between the level of trust and the frequencies of different trust- and distrust-building processes. However, the small number of participants is normal for verbal protocol analysis studies, given the significant effort and time needed for protocol analysis. Actually, our sample size and the volume of the protocols analyzed are larger than most protocol analysis studies reported in the literature. Thus, the sample size can also be considered a strength when it is compared with that of other protocol analysis studies. A second limitation in this study is the use of university students as subjects. We tried to alleviate this concern by pre-screening subjects to make sure that all the participants were past users of e-commerce and potential customers of the product involved in the experiment. A third limitation was the role of emotions in trust- and distrust-building processes. We found customers' emotional reactions to play a role in the evaluation of the RA's trustworthiness, but it was beyond the scope of this study to investigate their role.

6.2 Theoretical Implications and Contributions

This paper brings the opportunities for – and challenges of – managing trust-building and distrust-building processes into focus, introducing a new theoretical framework for understanding the trust process and the distrust process in the context of individual online customers' use of recommendation agents. This study is theory building research. It theoretically proposes and provides empirical evidence that the trust process and the distrust process are two distinct and separate processes.

This study provides an alternative way to think of trust and distrust. Prior research on this topic is mainly theoretical without empirical evidence, and previous studies have focused on the constructs of trust and distrust (one-construct view vs. two-construct view) rather than on the process of their development (two-process view). This study shows that the trust and distrust processes are distinct and separate. The results of our process-tracing study show that, while a customer is interacting with an RA, trust and distrust processes co-exist simultaneously and separately. The pattern of the trust process is significantly different from the pattern of the distrust process, and the patterns of trust (distrust) processes are similar when one RA characteristic (the level of perceived personalization) varies. Our results suggest that it is important to consider both trust and distrust within one relationship. Focusing solely on trust may provide an incomplete picture of various relationships (e.g., RA usage), which actually involve both trust and distrust. A more complete and balanced view of both trust and distrust is likely to lead to more effective management of these relationships.

This proposed two-process view of trust and distrust may be used in the future to resolve the one-construct vs. two-construct view, because one way to test these views is to examine whether the manner in which people form trust differs from the manner in which people form distrust. If the processes of trust building and distrust building differ, then it is likely that the two resulting constructs (trust and distrust) also differ. If trust and distrust exist separately, then it is likely that separate processes that build trust and distrust also exist. However, this paper does not aim to accomplish such a resolution; instead, it proposes the two-process view as an alternative way to understand the relationship between trust and distrust.

This study makes another theoretical contribution by revealing the patterns of trust and distrust processes in the context of RA usage. As shown in Figure 1 and Table 2, the major trust process (i.e., whose relative frequency in the overall trust processes is greater than 10%) includes Competence Attribution (32%), Information Sharing Evaluation (21%), Verification (13%), and Expectation Evaluation (10%). Also shown in Figure 1 and Table 2, the major distrust processes in RA usage include: "Awareness of Unknown" Interpretation (28%), Competence Attribution (22%), and

Expectation Evaluation (20%). The results show that separate research is required into trust and distrust, since the manner in which people form trust is different from the manner in which people form distrust.

It is also interesting that the RA personalization level changes the absolute numbers of trust processes and distrust processes, while the patterns of trust- (distrust-)building processes are similar across the two RAs with different personalization levels. This occurs even though the patterns of the trust- and distrust-building processes are different within each type of RA. In other words, the RA's characteristic (perceived personalization) proportionally changes the frequencies of various trust (distrust) processes during customers' interactions with the RA, but not the pattern of trust (distrust) processes. In addition to the results reported in this study, we later conducted additional process-tracing studies on an RA with lower personalization for a digital camera and an RA with higher personalization for a digital camera. The patterns were still similar across RA types (RA personalization: low vs. high) and across product types (laptop vs. digital camera). Further investigation is required to confirm the generalizability of the trust/distrust patterns for various RAs and for other support technologies. If the patterns of trust and distrust processes are similar across various technologies and various stages of customers' interactions with these technologies, then the patterns revealed in this study may serve as a reliable and useful tool for technology design and for trust and distrust research in the future.

6.3 Practical Implications and Contributions

The current study reveals that the RA designs conceived to boost trust should be different from the RA designs conceived to reduce distrust. This is important because the major trust processes are different from the major distrust processes. Second, this study provides empirical evidence that increasing RA personalization levels can effectively increase the number of trust-building processes and reduce the number of distrust-building processes. This result helps to explain why customers trust the RA with higher personalization more than they trust the RA with lower personalization (Komiak and Benbasat 2006).

The patterns of trust and distrust processes help to inform RA designers about how to build more trustworthy RAs. RA designers can implement the results of this study by focusing on the major trust process; they can change the RA's knowledge base, interface, questions, and recommendation generation, etc., in order to shape the way that customers interpret their RA interactions. The pattern of trust processes shows that major trust processes include Competence Attribution, Information Sharing Evaluation, Verification, and Expectation Evaluation. These processes are mainly related to the RA's knowledge base and its recommendations and explanations. Competence, rather than benevolence or the integrity of an RA, is the most important trustworthiness dimension. An RA may trigger more Competence Attribution processes by giving explanations on how to positively interpret its features. For example, an RA may explicitly explain to the customer that is very competent because it is searching more than 1,000 digital cameras from over 100 web sites before it makes product recommendations. To encourage a more positive process of Information Sharing Evaluation, the RA may emphasize the price and the overall rating for each recommended product and make detailed product information available through hyperlinks, but let the customer decide in how much detail the information should be viewed. The RA may also use data visualization (e.g., pictures, graphs, and tables) to help the customer understand a large volume of information without requiring too much cognitive effort. For example, to explain two different types of computer screens, the RA can explain in several paragraphs full of technical terms, or the RA can present two pictures of the computer screen, and simply explain that the two types of screens are different in terms of clarity and weight. The Verification Process may be enhanced by including third-party endorsements (e.g., customer endorsements, hyperlinks to websites of reputable third parties such as Consumer Reports or Amazon's customer review). Recommending famous brand name products, explaining the RA's recommendations through comparison and contrast with some well-known products, or word-of-mouth (e.g., either from real-world friends or virtual friends in a virtual community on the Internet) can also improve the Verification Process. A customer's prior shopping history or personal experience (e.g., as revealed at www.facebook.com, blogs, or bulletin board systems) could also be utilized by

the RA. An RA can be designed to increase customers' expectation confirmation and reduce expectation disconfirmation, through increasing user involvement at the RA design and implementation stages, or through increasing the RA's personalization level.

How can we design an RA in order to decrease the number of distrust-building processes? RA designers should focus on the major distrust processes, including: "Awareness of Unknown" Interpretation, Competence Attribution, and Expectation Evaluation. To reduce distrust-building processes, the most important strategy for RA design is to increase the RA's ability to alleviate individual customers' awareness of the unknown. When customers recognize that there is something that they do not know about the RA, ideally the RA should be designed to let customers fully express their awareness of the unknown. The RA could also infer the customers' awareness of the unknown from the customers' click-streams, etc. Either way, the RA needs to provide answers to the customers quickly. The RA may do so by providing some detailed how-to explanations, as Microsoft Word's little Help agent does. The RA may also include a MSN-instant-message-like online Customer Help service so that a confused customer can receive instant and personalized help from a real person. Thus, something unknown to customers would be converted into something that is known. When the RA collects sensitive personal information, it can reduce the "Awareness of Unknown" Interpretation Process by explaining why the information needs to be collected and how the collected information will be used. In order to reduce negative Competence Attribution, the RA can offer explanations to shape the customer's attribution processes. For example, it may take up to 30 seconds for the RA to search several databases from many web sites. It is possible that the customer may think the RA is incompetent because of the 30-second waiting period. To reduce this distrust process, the RA can show the stages of RA's searching and reasoning on the screen while the customer is waiting, or the RA can explain that the RA is very competent since it is trying to download many product images. To decrease the Expectation Disconfirmation, RA designers may involve the users in the RA design process in order to understand user expectations. The RA should be designed not to give the user too high of an expectation. For example, if it usually takes about 30 seconds for the RA to run product filtering and ranking, then the RA can display a message on the screen saying "It will take up to one minute for data searching and ranking."

In conclusion, this study offers some insights on how customers process RAs' information in order to build trust or distrust. Future investigation is needed to assess how different RA designs will actually affect trust and distrust processes and the level of trust.

References

Ariely, D., Lynch, J.G., and Aparicio, M. "Learning by collaborative and individual-based recommendation agents," *JOURNAL OF CONSUMER PSYCHOLOGY* (14:1-2) 2004, pp 81-95.

Baba, M.L. "Dangerous liaisons: Trust, distrust, and information technology in American work organizations," *Human Organization* (58:3), Fall 1999, pp 331-346.

Brashear, T.G., Boles, J.S., Bellenger, D.N., and Brooks, C.M. "An Empirical Test of Trust-Building Processes and Outcomes in Sales Manager–Salesperson Relationships," *Journal of the Academy of Marketing Science* (31:2), Spr 2003, pp 189-200.

Chiasson, T., Hawkey, K., McAllister, M., and Slonim, J. "An architecture in support of universal access to electronic commerce," *Information and Software Technology* (44:5), April 2002, pp 279-289.

Chopra, K., and Wallace, W.A. "Trust in Electronic Environments," Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS 2003), IEEE, Hawaii, 2003.

Cofta, P. "Distrust," International Conference on Entertainment Computing (ICEC 2006), ACM, Fredericton, New Brunswick, Canada, 2006, pp. 250-258.

Cohen, J.A. "A Coefficient of Agreement for Nominal Scales," *Educational and Psychological Measurement* (20) 1960, pp 37-46.

Coleman, T.F., and Li, Y.Y. "A trust region and affine scaling interior point method for nonconvex minimization with linear inequality constraints," *Mathematical Programming* (88:1), Jun 2000, pp 1-31.

Deutsch, M. "Trust and suspicion," *Journal of Conflict Resolution* (2) 1958, pp 265-279
Deutsch, T. "Brand new: How entrepreneurs earned consumers' trust from Wedgwood to Dell," *Journal of American History* (90:2), Sep 2003, pp 683-683.
Doney, P.-M., and Cannon, J.-P. "An examination of the nature of trust in buyer-seller relationships," *Journal of Marketing* (61:2) 1997, pp 35-51.
Earle, T.C. "Thinking aloud about trust: A protocol analysis of trust in risk management," *Risk Analysis* (24:1), FEB 2004, pp 169-183.
Fein, S., and Hilton, J.L. "Judging Others in the Shadow of Suspicion," *Motivation and Emotion* (18:2), Jun 1994, pp 167-198.
Gambetta, D. "Can we trust trust?," in: *Trust: Making and Breaking Cooperative Relations,* D. Gambetta (ed.), Blackwell, Oxford, UK, 1988, pp. 154-175.
Hsiao, R.L. "Technology fears: distrust and cultural persistence in electronic marketplace adoption," *Journal of Strategic Information Systems* (12:3), Oct 2003, pp 169-199.
Johns, J.L. "A concept analysis of trust," *Journal of Advanced Nursing* (24:1), Jul 1996, pp 76-83.
Komiak, S.Y.X., and Benbasat, I. "Understanding Customer Trust in Agent-mediated Electronic Commerce, Web-mediated Electronic Commerce, and Traditional Commerce," *Information Technology and Management* (5:1&2) 2004, pp 181-207.
Komiak, S.Y.X., and Benbasat, I. "The Impact of Personalization and Familiarity on Trust and Adoption of Recommendation Agents," *MIS Quarterly* (30:4), December 2006, pp 941-960.
Kramer, R.M. "Trust and Distrust in Organizations: Emerging Perspectives, Enduring Questions," *Annual Reviews of Psychology* (50) 1999, pp 569-598.
Kretschmer, H., and Rousseau, R. "Author inflation leads to a breakdown of Lotka's law," *Journal of the American Society for Information Science and Technology* (52:8) 2001, pp 610-614.
Lewicki, R.J., and Bunker, B.B. "Trust in Relationships: A Model of Trust Development and Decline," in: *Conflict, Cooperation and Justice B2 - Conflict, Cooperation and Justice,* B.B. Bunker and J.Z. Rubin (eds.), Jossey-Bass, San Francisco, 1995, pp. 133-173.
Lewicki, R.J., McAllister, D.J., and Bies, R.J. "Trust and distrust: New relationships and realities," *Academy of Management Review* (23:3), Jul 1998, pp 438-458.
Lewis, D.J., and Weigert, A. "Trust as a social reality," *Social Forces* (63:4), June 1985, pp 967-985.
Maes, P., Guttman, R.H., and Moukas, A.G. "Agents That Buy And Sell," *Communications of the ACM* (42:3), March 1999.
Mayer, R.C., Davis, J.H., and Schoorman, F.D. "An Integrative Model of Organizational Trust," *Academy of Management Review* (20:3), Jul 1995, pp 709-734.
McKnight, D.H., Choudhury, V., and Kacmar, C. "Developing and Validating Trust Measures for e-Commerce: An Integrative Typology," *Information Systems Research* (13:3), September 2002, pp 334-359.
McKnight, D.H., Cummings, L.L., and Chervany, N.L. "Initial trust building in new organizational relationships," in: *Academy of Management Review*, 1998, pp. 472-490.
McKnight, D.H., Kacmar, C.J., and Choudhury, V. "Dispositional trust and distrust distinctions in predicting high- and low-risk internet expert advice site Perceptions1," *E-Service Journal* (3:2) 2004, pp 35-.
Mishler, W., and Rose, R. "Trust, distrust and skepticism: Popular evaluations of civil and political institutions in post-communist societies," *Journal of Politics* (59:2), May 1997, pp 418-451.
Mohr, L.A. "Qualitative methods for marketplace research," *Journal of Marketing Research* (39:2), May 2002, pp 275-276.
Shaft, T.M., and Vessey, I. "The relevance of application domain knowledge: The case of computer program comprehension," *Information Systems Research* (6:3) 1995, pp 286-299.
Shaw, T., and Jarvenpaa, S. "Process Models in Information Systems," Proceedings of the Information Systems and Qualitative Research, Proceeding of IFIP 8.2, Philadelphia, Pennsylvania, 1997, pp. 70-100.
Sheppard, B.H., and Sherman, D.M. "The grammars of trust: A model and general implications," *Academy of Management Review* (23:3), Jul 1998, pp 422-437.
Singh, J., and Sirdeshmukh, D. "Agency and trust mechanisms in consumer satisfaction and loyalty judgments," *Journal of the Academy of Marketing Science* (28:1), Win 2000, pp 150-167.
Sitkin, S.B., and Roth, N.L. "Explaining the Limited Effectiveness of Legalistic Remedies for Trust/Distrust," *Organization Science* (4:3) 1993, pp 367-392.

Slonim, J., Chiasson, T., Gates, C., and McAllister, M. "An extensible, human-centric framework that promotes universal access to electronic commerce," in: *Electronic Commerce Technologies, Proceedings*, SPRINGER-VERLAG BERLIN, Berlin, 2001, pp. 116-126.

Stack, L.C. "Trust," in: *Dimensionality of Personality* H. London and J.E.J. Exner (eds.), Wiley, New York, 1988, pp. 561-599.

Swan, J.E., Bowers, M.R., and Richardson, L.D. "Customer Trust In The Salesperson: An Integrative Review And Meta-Analysis Of The Empirical Literature," *Journal of Business Research* (44:2), February 1999, pp 93-107.

Sztompka, P. *Trust: A Sociological Theory* Cambridge University Press, Cambridge, UK, 1999.

Tam, K.Y., and Ho, S.Y. "Understanding the impact of web personalization on user information processing and decision outcomes," *MIS Quarterly* (30:4), December 2006, pp 865-890.

Tardy, C.H. "Interpersonal evaluations: Measuring attraction and trust," in: *A Handbook for the Study of Human Communication,* C.H. Tardy (ed.), Ablex Publishing, Norwood, NJ, 1988, pp. 269-283.

Todd, P., and Benbasat, I. "Process Tracing Methods in Decision Support Research: Exploring the Black Box," *MIS Quarterly*: December) 1987, pp 493-512.

Trotter, A. "Plagiarism Controversy Engulfs Kansas School," in: *Education Week*, 2002, p. 5.

Worchel, P. "Trust and Distrust," in: *The Social Psychology of Intergroup Relations,* W.G. Austin and S. Worchel (eds.), Wadsworth, Belmont, CA 1979, pp. 174-187.

Wyer, R.S., and Srull, T.K. *Memory and Cognition in its Social Context* Lawrence Erlbaum Association, Mahwah, NJ, 1989.

Xiao, B., and Benbasat, I. "Consumer Decision Support Systems for E-Commerce: Design and Adoption of Product Recommendation Agents," *MIS Quarterly* (31:1), March 2007.

About the Authors

Sherrie Y. X. Komiak is an associate professor of Information Systems at the Faculty of Business Administration, Memorial University of Newfoundland, Canada. She published on MIS Quarterly, Electronic Markets, Information Technology and Management, and e-Service Journal. Her research interests include human–computer interaction, trust in electronic commerce, IT adoption, personalization, recommendation agents, knowledge-based systems, and decision support systems.

Izak Benbasat, Fellow of the Royal Society of Canada, is CANADA Research Chair in Information Technology Management at the Sauder School of Business, the University of British Columbia, Canada. He has served as the editor-in-chief of Information Systems Research, a senior editor of MIS Quarterly, and a senior editor of Journal of AIS. His research interests include human–computer interface design for electronic business.

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